

ORIGINAL ARTICLE

Four new species of *sanguinolenta*-group of the genus *Macrophya* (Hymenoptera: Tenthredinidae) from China

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Abstract Four new species of the *sanguinolenta*-group of the genus *Macrophya* from China are described, namely *M. cheni* **sp. nov.**, *M. yichangensis* **sp. nov.**, *M. elegansoma* **sp. nov.**, and *M. reni* **sp. nov.** The species *M. cheni* **sp. nov.** and *M. yichangensis* **sp. nov.** belong to the *koreana*-subgroup, while *M. elegansoma* **sp. nov.** and *M. reni* **sp. nov.** belong to the *sanguinolenta*-subgroup. The division of the *koreana* and *sanguinolenta*-subgroups are briefly discussed. Keys to all known species of the *koreana* and *sanguinolenta*-subgroups from China are provided, respectively. The type specimens of new species are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China.

Key words Symphyta, Tenthredinoidea, *Macrophya*, taxonomy.

1 Introduction

The genus *Macrophya* Dahlbom, 1835, is one of the largest genus of Tenthredinidae, contains 258 species worldwide (Li & Wei, 2013; Li *et al.*, 2013a, 2013b, 2013c, 2014a, 2014b) and 122 species in China (Wei *et al.*, 2006, 2013; Taeger *et al.*, 2010; Zhao *et al.*, 2010; Zhao & Wei, 2011; Zhu *et al.*, 2012; Li *et al.*, 2012, 2013a, 2013b, 2013c, 2014a; Li & Wei, 2012, 2013; Wu *et al.*, 2012). It includes 27 species groups worldwide preliminary (Li *et al.*, 2014a). In China, 20 species groups have been reported: *apicalis*-group, *blanda*-group, *coxalis*-group, *crassuliformis*-group, *duodecimpunctata*-group, *flavomaculata*-group, *formosana*-group, *histrio*-group, *imitator*-group, *jiuzhaina*-group, *ligustri*-group, *malaisei*-group, *planata*-group, *pompilina*-group, *regia*-group, *sanguinolenta*-group, *sheni*-group, *sibirica*-group, *vittata*-group and *zhaoae*-group. The species group, *sanguinolenta*-group, is the largest group of *Macrophya*, containing 40 known species worldwide, of which, 35 species are reported in China (Li *et al.*, 2013a, 2014a; Wei *et al.*, 2013). It can be divided into 4 subgroups, *tongi*-subgroup, *depressina*-subgroup, *koreana*-subgroup, and *sanguinolenta*-subgroup. The former two species subgroups are reported recently (Li *et al.*, 2014a).

In this paper, 4 new species from China are reported, belonging to *koreana*-subgroup and *sanguinolenta*-subgroup, respectively. The diagnosis and key to both subgroups from China are individually provided.

2 Materials and methods

The specimens were examined with a Motic-SMZ-168 steatomicroscope. Adult images were taken with a Nikon

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D700 digital camera and a series of images montaged using Helicon Focus (©HeliconSoft). All images were further processed with Adobe Photoshop CS 11.0.

Morphological descriptions of new species are based on the holotype. The terminology of sawfly morphology and genitalia characters follows Ross (1945) and Viitasaari (2002).

The specimens examined in this study, including all holotypes and paratypes of the new species, are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China.

3 Taxonomy

3.1 The *koreana*-subgroup

Diagnosis. Species of *koreana*-subgroup have body mostly black, without metallic tinged macula. The subgroup is characterized by the antennomeres and hind femur entirely black, hind tibia more or less with reddish maculae, posterior corner of metepimeron without distinct appendage.

The *koreana*-subgroup contains 7 species: *M. kongosana* Takeuchi (North Korea), *M. koreana* Takeuchi (Russia, North Korea, China), *M. fulvostigmata* Wei & Chen (China), *M. minutiluna* Wei & Chen (China), *M. zhongi* Wei & Chen (China), *M. dabieshanica* Wei & Xu (China) and *M. liui* Wei & Li (China) (Takeuchi, 1937; Wei & Chen, 2002; Wei *et al.*, 2013). Two species are reported as new to science here, namely *M. cheni* **sp. nov.** and *M. yichangensis* **sp. nov.**

Key to species of the *koreana*-subgroup from China

1. Dorsal fron with dense punctures, interspaces between punctures narrow; labrum and mesoscutellum entirely black; posterolateral tergite 1 with broad white macula, tergite 2 entirely black; or lateral tergite 2 with small maculae; costal vein in fore wing and stigma black brown 2
 Dorsal fron with sparse punctures, interspaces between punctures broad; labrum mostly or entirely white; tergite 1 entirely black, posterolateral tergite without white macula; lateral tergite 2 with large white macula; or costal vein in fore wing and stigma yellowish brown 6
2. Fore wing without smoky transverse band below stigma 3
 Fore wing with smoky transverse bands below stigma 5
3. Pronotum and tergites 2–10 entirely black; antennomere 3 longer than apical antennomeres 7–9 combined; apical sheath longer than basal sheath; dorsal side of head with smooth interspaces between punctures, without microsculpture; anal cell in fore wing with a short and erect cross vein; anterior margin shallowly incised to 1/3 length of clypeus; hind coxa with a white macula on outer side 1/2 times length of coxa; all known males with hind tibia and tarsi black, without reddish macula 4
 Posterior margin of pronotum with narrow, white maculae; lateral tergites 2–5 with distinct, white maculae, tergites 6–10 entirely black (Fig. 10); antennomere 3 as long as apical antennomeres 7–9 combined (Fig. 14); apical sheath slightly shorter than basal sheath (Fig. 16); dorsal side of head without smooth interspaces between punctures, but with distinct microsculptures (Fig. 12); petiole of anal cell in fore wing slightly longer than vein 1r-m (Fig. 10); anterior margin shallowly incised to 2/5 length of clypeus (Fig. 13); hind coxa with a white macula on outer side 3/5 times length of coxa; all known males with most of hind tibia and tarsus with reddish maculae, rest with black maculae or white maculae. China (Hubei) ***M. yichangensis* sp. nov.**
4. Subapical antennomeres distinctly inflated, antennomere 6 about 1.2 times longer than broad; ovipositor sheath distinctly shorter than fore femur (6:7), apical sheath slightly longer than basal sheath (8:7); middle serrulae with 4–6 distal teeth. China (Henan, Hubei) ***M. liui* Wei & Li, 2013**
 Subapical antennomeres weakly inflated, antennomere 6 not less than 2 times longer than broad; ovipositor sheath as long as than fore femur, apical sheath distinctly longer than basal sheath (11:7); middle serrulae with 8–10 distal teeth. China (Inner Mongolia, Gansu, Shaanxi, Beijing, Shanxi, Henan); North Korea; Russia ***M. koreana* Takeuchi, 1937**
5. Middle fovea shallow, long dot-like, lateral foveae not deep (Fig. 2) ; postocellar area 2.2 times broader than long (Fig. 2); dorsal side of hind tibia without white macula subapically; setae on sheath curved in dorsal view; middle serrulae of lancet with 7–10 distal teeth, subbasal teeth small (Fig. 9). China (Hubei, Guizhou) ***M. cheni* sp. nov.**
 Middle fovea distinct, broad dot-like; lateral foveae deep; postocellar area 2 times broader than long; dorsal side of hind tibia with a small white macula subapically; setae on sheath almost not curved in dorsal view; middle serrulae of lancet with 5–6 distal teeth, subbasal teeth slightly large. China (Henan) ***M. minutiluna* Wei & Chen, 2002**

6. Hind tibia with long, white macula; hind trochanter black; metabasitarsus reddish brown, short parts with white maculae; clypeus and labrum white, with black maculae at times; mesoscutellum white; serrulae flat. North Korea ***M. kongosana* Takeuchi, 1937**
Hind tibia without white macula; most of hind trochanter or entirely white; metabasitarsus reddish brown or black brown, without white macula 7
7. Clypeus white; all trochanters and basal 1/3 of hind femur with yellowish white maculae; costal vein in fore wing and stigma yellowish brown; tergite 2 entirely black; mesoscutellum entirely black; subapical antennomeres 5–8 inflated strongly; most of mesepisternum with small punctures. China (Henan) ***M. fulvostigmata* Wei & Chen, 2002**
Clypeus black; fore and middle trochanters and hind femur entirely black; costal vein in fore wing and stigma black brown; tergite 2 not entirely black, lateral tergite with distinct, white maculae; mesoscutellum largely white; most of mesepisternum with large punctures 8
8. Subapical antennomeres 5–8 strongly compressed and inflated, antennomere 7 less than 2 times longer than broad; anterior margin half roundish and incised to 1/2 length of clypeus; petiole of anal cell in fore wing longer than vein r+m; hind tarsi with reddish brown maculae in two sex; valviceps of penis valve trapezoid, annular spine bands joined each other in the middle part. China (Henan) ***M. zhongi* Wei & Chen, 2002**
Subapical antennomeres 5–8 weakly inflated, hardly compressed, antennomere 7 about 2.5 times longer than broad; anterior margin circular arc and incised to 1/3 length of clypeus, lateral lobes obtuse triangular; petiole of anal cell in fore wing shorter than vein r+m; hind tarsus black brown in male; valviceps of penis valve approximate to oblique rectangle, dorsal margin arc, annular spine bands separated each other in the middle part. China (Anhui) ***M. dabieshanica* Wei & Xu, 2013**

3.1.1 *Macrophya cheni* sp. nov. (Figs 1–9)

Diagnosis. The new species is similar to *M. minutiluna* Wei & Chen, 2002 from China. Compared with *M. minutiluna*, the new species is characterized by middle fovea shallow, long dot-like; lateral foveae not deep; postocellar area 2.2 times broader than long; dorsal side of hind tibia without white macula subapically; setae on sheath curved in dorsal view; middle serrulae of lancet with 7–10 distal teeth, subbasal teeth small. In *M. minutiluna*, middle fovea distinct, broad dot-like; lateral foveae deep; postocellar area 2 times broader than long; dorsal side of hind tibia with a small white macula subapically; setae on sheath almost not curved in dorsal view; middle serrulae of lancet with 5–6 distal teeth, subbasal teeth slightly large.

Description. Female. Body length 7.0 mm. Body mostly black. The following parts white: base of mandibles, apical 1/2 of clypeus, posterior margin of postocellar area, narrow band on posterior margin of pronotum, broad band on posterior margin of tergite 1, transverse maculae on posterior corners of tergite 3–5 (small maculae on posterior corners of tergite 2 and 6 at times), apical margin of tergite 10, apical margins and narrow stripes of fore and middle coxae, apex and a long oval macula on outer side of hind coxa basally, small maculae on anterior sides of fore and middle femora apically, stripes on anterior side of fore tibia and hind trochanter. The following parts reddish brown: hind tibia except for apical 1/3 with black maculae (or hind tibia almost entirely reddish brown, apical margin with feeble black maculae), metabasitarsus except for apex with black maculae, hind tarsomere 2–4 except apex with black maculae. Body hairs silver, setae on sheath black brown. Wings hyaline, below stigma with feeble and pale smoky, transverse maculae, stigma and veins black brown (Fig. 1).

Dorsal head less shiny, frons densely and coarsely punctured, without smooth interspaces and microsculpture between punctures (Fig. 2); labrum and clypeus with large and shallow punctures, surface weakly coriaceous. Mesonotum less shiny, punctures on mesonotum as minute and dense as punctures on head, almost without smooth interspaces between punctures; mesoscutellum less shiny, with large punctures, interspaces between punctures narrow; posttergite with shallow punctures; metascutellum with indistinct punctures, microsculptures fine. Mesepisternum densely punctured, not distinctly coarse, interspaces with fine microsculptures between punctures, upper 1/2 with slightly large punctures, lower 1/2 with slightly minute punctures; anepimeron dull, with dense wrinkles; anterior margin of katepimeron smooth and shiny, without puncture or microsculpture; most of posterior area with coarse and rugose punctures, microsculptures distinct; metepisternum dull, minutely and densely punctured; metepimeron with shallow and sparse punctures, microsculptures distinct (Fig. 5). All tergites less shiny, lateral tergite 1 shallowly punctured, center without distinct microsculpture; other tergites with fine microsculptures, punctures minute and shallow. Surface of sheath coriaceous, with indistinct punctures and fine microsculptures. Hind coxa and hind femur densely punctured on outer side, interspaces between punctures with fine microsculptures.

Labrum weakly elevated, anterior margin truncated; clypeus weakly elevated, slightly broader than distance between lower corner of eyes; lateral sides distinctly convergent forwards, anterior margin subarc and incised to approximately 1/3

length of clypeus, lateral lobes subtriangular, apical margins obtuse (Fig. 3); malar space 0.5 times diameter of middle ocellus; frons elevated, ocellus slightly higher than top of eyes in lateral view; middle fovea shallow but distinct; lateral foveae deep, short dot like; interocellar furrow distinct, postocellar furrow indistinct; POL : OOL : OCL = 5 : 10 : 6.5; postocellar area weakly elevated, 2.2 times broader than long, lateral furrows slightly shallow and divergent backwards; head strongly narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, 1.4 times longer than head and thorax together (17:12), 1.1 times longer than abdomen (17:14); antennomere 2 about 1.3 times as long as broad; antennomere 3 about 1.4 times as long as antennomere 4 (10:7), 0.8 times as long as antennomeres 4 and 5 combined



Figs 1–9. *Macrophya cheni* sp. nov. 1. Adult female, dorsal view. 2. Female head, dorsal view. 3. Female head, front view. 4. Female antenna. 5. Female mesopleuron and metapleuron. 6. Female hind tibia and tarsus, lateral view. 7. Ovipositor sheath, lateral view. 8. Lancet. 9. The 8th–10th serrulae of lancet. Scale bars: 1 = 1 mm, 8 = 100 µm, 9 = 50 µm.

(4:5), antennomeres 6–9 weakly compressed (Fig. 4). Mesoscutellum roundly elevated, without carina, as high as top of mesonotum in lateral view; posttergite with lower middle carina, metascutellum with short middle carina; dorsal-posterior platform of mesepimeron 1.2 times as broad as diameter of lateral ocellus; posterior corner of metepimeron subquadrate, without appendage; mesopleuron and metapleuron as shown in Fig. 5; distance between cenchri thrice breadth of a cenchrus. Inner tibial spur of hind leg approximately 0.67 times length of metabasitarsus (2:3); metabasitarsus slender, 1.1 times longer than following 4 tarsomeres together (12:11), hind tibia and tarsus as shown in Fig. 6; claw with inner tooth shorter than outer tooth. Ovipositor sheath as long as middle femur, approximately 0.83 times as long as metabasitarsus (5:6), apical sheath slightly longer than basal sheath (8:7), apical margin roundish in lateral view (Fig. 7). Fore wing with vein cu-a joining cell 1M at basal 1/4, vein 2r joining cell 2Rs at apical 1/3, cell 2Rs slightly longer than cell 1Rs; petiole of anal cell in fore wing 2 times longer than vein 1r-m, but slightly shorter than vein cu-a; petiole of anal cell in hind wing as long as 1/2 times length of vein cu-a. Lancet with 19 serrulae (Fig. 8), serrulae slightly flat, middle serrulae each with 1 proximal and 7–10 distal teeth, subbasal teeth small, annular spine bands broad, spine dense; serrulae 8–10 at base as shown in Fig. 9.

Male. Unknown.

Holotype female, China, Hubei, Mt. Shennongjia, Honghuaduo Forest Farm (31°15'N, 109°56'E; elev. 1200m), 3 July 2007, Yi-Hai Zhong leg. Paratype 1 female, China, Guizhou, Mt. Fanjing, Jinding, 13 July 1983, Xue-Xin Chen leg.

Distribution. China (Hubei, Guizhou).

Etymology. The specific name is from the family name of the collector, and for the honor of Prof. Xue-Xin Chen.

3.1.2 *Macrophya yichangensis* sp. nov. (Figs 10–22)

Diagnosis. The new species is similar to *M. minutiluna* Wei & Chen, 2002 from China. Compared with *M. minutiluna*, the new species is characterized by dorsal frons densely and coarsely punctured, without smooth interspace; clypeus entirely black; dorsal side of hind tibia without white macula subapically; fore wing hyaline, below stigma without smoky macula; middle serrulae of lancet with 7–8 distal teeth, subbasal teeth small. In *M. minutiluna*, dorsal frons slightly densely punctured, smooth interspaces between punctures narrow; clypeus largely black, lateral lobes with small, white maculae; a small white macula on dorsal side of hind tibia subapically; fore wing largely hyaline, below stigma with feeble and pale smoky, transverse maculae; middle serrulae of lancet with 5–6 distal teeth, subbasal teeth large.

Description. Female. Body length 6.5–7.0 mm. Body mostly black, except palp mostly pale brown and some white or reddish brown parts. The following parts white: a small and short triangular macula on anterior margin of labrum, basal 1/2 of mandibles, posterior margin of postocellar area, narrow band on posterior margin of pronotum, apical 1/3 of tergite 1, transverse maculae on posterior corners of tergite 2–5, apical margin of fore coxa, apical margin and stripes of middle coxa on outer side, apex and an oval macula of hind tibia on outer side basally, fore and middle trochanters on dorsal side, hind trochanter, small maculae of fore and middle femora on anterior sides apically, basal margin of hind femur, anterior side largely of fore tibia, apex on anterior side of middle tibia. The following parts reddish brown: center of middle tibia on anterior side, hind tibia except for base and apex with black maculae, most of middle tarsus, hind tarsus almost entirely. Body hairs silver, setae on sheath pale black brown. Wings hyaline, without smoky macula, stigma and veins black (Fig. 10).

Dorsal head less shiny, frons densely and coarsely punctured, without smooth interspaces between punctures (Fig. 12); labrum and clypeus with some large and shallow punctures, surface weakly coriaceous. Mesonotum less shiny, punctures on mesonotum as minute and dense as punctures on head, without smooth interspaces between punctures; mesoscutellum less shiny, with some large punctures, interspaces between punctures narrow; posttergite and metascutellum with distinct microsculptures and punctures; mesepisternum densely punctured, not distinctly coarse, interspaces with fine microsculptures between punctures, upper 1/2 with slightly large punctures, lower 1/2 with slightly minute punctures; anepimeron dim, with dense wrinkles; anterior margin of katepimeron smooth and shiny, without puncture or microsculpture; posterior area coarsely punctured and rugose, microsculptures distinct; metepisternum dull, minutely and densely punctured, without smooth area; metepimeron with shallow and sparse punctures, microsculptures distinct (Fig. 15). All tergites less shiny, lateral tergite 1 shallowly punctured, other tergites with fine microsculptures and minute, indistinct punctures. Surface of sheath coriaceous, with indistinct punctures and fine microsculptures. Hind coxa and femur densely punctured on outer side, interspaces between punctures with fine microsculptures.



Figs 10–22. *Macrophya yichangensis* sp. nov. 10. Adult female, dorsal view. 11. Adult male, dorsal view. 12. Female head, dorsal view. 13. Female head, front view. 14. Female antenna. 15. Female mesopleuron and metapleuron. 16. Ovipositor sheath, lateral view. 17. Male head, front view. 18. Male head. 19. Lancet. 20. The 8th–10th serrulae of lancet. 21. Gonoforceps. 22. Penis valve. Scale bars: 10–11 = 1 mm, 17, 21 = 100 μ m, 18, 22 = 50 μ m.

Labrum distinctly elevated, anterior margin truncated; clypeus elevated, slightly broader than distance between lower corner of eyes; lateral sides convergent forwards, anterior margin subarc and incised to approximately 2/5 length of clypeus, lateral lobes slightly narrow and long (Fig. 13); malar space 0.6 times diameter of middle ocellus; frons slightly elevated, ocellus slightly higher than top of eyes in lateral view; middle fovea shallow but distinct; lateral foveae deep, furrow like; interocellar furrow distinct, postocellar furrow indistinct; POL:OOL:OCL=5:10:6; postocellar area weakly elevated, 2.2 times broader than long, lateral furrows slightly broad and deep, clearly divergent backwards; head strongly narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, 1.25 times longer than head and thorax together (5:4), 0.9 times longer than abdomen; antennomere 2 about 1.3 times as long as broad; antennomere 3 about 1.9 times as long as antennomere 4 (19:10), 0.9 times as long as antennomeres 4 and 5 combined (19:20), antennomeres 6–9 weakly compressed (Fig. 14). Mesoscutellum roundly elevated, without carina, as high as top of mesonotum in lateral view; posttergite with acute middle carina, metascutellum with distinct middle carina; dorsal-posterior platform of mesepimeron, equal to diameter of lateral ocellus; posterior corner of metepimeron subquadrate, without appendage; mesopleuron and metapleuron as shown in Fig. 15; distance between cenchri twice breadth of a cenchrus. Inner tibial spur of hind leg approximately 0.7 times length of metabasitarsus (21:31); metabasitarsus slender, 1.2 times longer than following 4 tarsomeres together (31:27); claw with inner tooth shorter than outer tooth. Ovipositor sheath slightly shorter than metabasitarsus (15:16), apical sheath slightly longer than basal sheath (8:7), apical margin roundish in lateral view (Fig. 16). Fore wing with vein cu-a joining cell 1M at basal 1/4, vein 2r joining cell 2Rs at apical 1/3, cell 2Rs slightly longer than cell 1Rs; petiole of anal cell in fore wing 1.5 times longer than vein 1r-m; petiole of anal cell in hind wing 1/2 times length of vein cu-a. Lancet with 20 serrulae (Fig. 17), middle serrulae weakly protruding and each with 1 proximal and 7–8 distal teeth, subbasal teeth small, annular spine bands slightly broad, spine dense; serrulae 8–10 at base as shown in Fig. 18.

Male. Body length 5.5–6.0 mm (Fig. 11), body color and structure similar to female, following parts white: labrum, apical 1/2 of clypeus (Fig. 19), base of all coxae, all trochanters, anterior side of fore femur, apex largely of middle femur on anterior side, anterior sides of fore and middle tibiae, fore and middle tarsus almost entirely, apex of hind tarsomere 2 on dorsal side and 3–4 tarsomere largely; antenna as shown in Fig. 20; center of subgenital plate elevated, subgenital plate longer than broad, apical margin roundish, gonoforceps as shown in Fig. 21; penis valve as shown in Fig. 22.

Holotype female, China, Hubei, Yichang City, Mt. Shennongjia, Guitouwan (31°28'N, 110°09'E; elev. 2 150 m), 25–28 May 2011, Ze-Jian Li leg., CSCS11022. Paratypes: 1 female, China, Hubei, Yichang City, Mt. Shennongjia, Yazikou (31°30'N, 110°21'E; elev. 1 920 m), 26 May 2011, Ze-Jian Li leg., CSCS11025; 1 female, China, Hubei, Yichang City, Mt. Shennongjia, Yazikou (31°30'N, 110°21'E; elev. 1 920 m), 20 May 2011, Ze-Jian Li leg., CSCS11023; 1 male, China, Hubei, Mt. Shennongjia, Xiaolongtan (31°29'N, 110°18'E; elev. 2 200 m), 24 May 2011, Ze-Jian Li leg., CSCS 11027; 1 male, same data as holotype.

Distribution. China (Hubei).

Etymology. The specific name refers to the type locality, Yichang, Hubei Province.

3.2 The *sanguinolenta*-subgroup

Diagnosis. The *sanguinolenta*-subgroup usually has body mostly black, without metallic tinged macula and antenna entirely black. It is characterized by hind femur and tibia more or less with reddish maculae, posterior corner of metepimeron without distinct appendage.

Thirteen species of *sanguinolenta*-subgroup is known from China: *M. sanguinolenta* Gmelin (Europe, Turkey, Mongolia, Japan, North Korea, China), *M. erythrocnema* A. Costa (Europe, Turkey, Caucasia, China), *M. canescens* Mallach (China), *M. rufoclypeata* Wei (China), *M. leucotarsalina* Wei & Chen (China), *M. pentanalia* Wei & Chen (China), *M. erythrocephalica* Wei & Nie (China), *M. maculotarsalina* Wei & Liu (China), *M. shennongjiana* Wei & Zhao (China), *M. jiangi* Zhao & Wei (China), *M. yangi* Wei & Zhu (China), *M. melanosomata* Wei & Xin (China) and *M. longipetiolata* Wei & Zhong (China) (Gmelin, 1790; A. Costa, 1859; Mallach, 1936; Wei & Nie, 1998; Wei & Chen, 1998; Wei & Nie, 2003; Liu & Wei, 2005; Zhao & Wei, 2011; Zhu *et al.*, 2012; Wu *et al.*, 2012; Li *et al.*, 2013a). Here, two species are described as new to science, *M. elegansoma* **sp. nov.** and *M. reni* **sp. nov.**

Key to species of the *sanguinolenta*-subgroup from China and Europe

- | | | |
|-----|--|--|
| 1. | Head and thorax in female largely with reddish brown and white maculae, shortly black; body in male largely with black maculae, short parts reddish and white..... | 2 |
| | Body in both sex largely black, short parts with some reddish and white maculae..... | 4 |
| 2. | Antennae clearly reduced, antennomeres 1–3 reddish brown; lateral lobes of clypeus obtuse and short; mesoscutellum and hind tarsus entirely reddish brown; inner side of hind femur with distinct, black maculae; stigma yellowish brown. (Antennae and mesoscutellum in male entirely black; hind tarsus entirely black; stigma blackish brown). China (Hunan, Guangxi, Fujian)..... | <i>M. erythrocephalica</i> Wei & Nie, 2003 |
| | Antennae weakly reduced, antennomeres 1–2 reddish brown; lateral lobes of clypeus narrow and long; mesoscutellum entirely white; inner side shortly of hind femur with some black maculae; hind tarsus largely white; stigma reddish brown to blackish brown..... | 3 |
| 3. | Dorsal fron and near area of the ocellus with large, black maculae; anepimeron and metapleuron entirely black; mesonotum with narrow, V-like and reddish brown maculae; middle serrulae of lancet each with 1 proximal tooth and 6–7 distal teeth. China (Shanxi, Henan)..... | <i>M. rufoclypeata</i> Wei, 1998 |
| | Dorsal fron and near area of the ocellus with small, black maculae; anepimeron largely and metapleuron largely reddish brown, shortly black; mesonotum with large, V-like and reddish brown maculae; middle serrulae of lancet each with 1 proximal tooth and 4–6 distal teeth. (Antennae and thorax in male entirely black). China (Ningxia, Henan)..... | <i>M. leucotarsalina</i> Wei & Chen, 1998 |
| 4. | Labrum and basal half of clypeus reddish brown; dorsal side of head and thorax with coarse and dense punctures, interspaces between the punctures not smooth; mesoscutellum entirely black. China (Hubei)..... | <i>M. jiangi</i> Wei & Zhao, 2011 |
| | Labrum and clypeus without reddish brown macula absolutely, other characteristics not different from the former..... | 5 |
| 5. | Dorsal side of hind tibia more or less with white maculae..... | 6 |
| | Dorsal side of hind tibia without white macula absolutely..... | 9 |
| 6. | Posterior corners of pronotum with clear, white maculae; mesoscutellum entirely white..... | 7 |
| | Posterior margin of pronotum with narrow, white maculae, or without white macula absolutely; center of mesoscutellum white or mesoscutellum entirely black..... | 8 |
| 7. | Labrum entirely and clypeus largely black, short parts white (Fig. 34); clypeus half round, incised to 1/2 length of clypeus, lateral lobes narrow and long (Fig. 34); 2 small, narrow maculae on posterior margin of postocellar area, not U-like (Fig. 33); anterior corners of pronotum entirely black (Fig. 31); tergites 6–9 entirely black, other tergites with distinct white maculae (Fig. 31); subapical 1/2 of hind tibia with a long, white macula on dorsal side; middle serrulae of lancet each with 2 distal teeth, subbasal teeth large (Fig. 40). China (Ningxia)..... | <i>M. reni</i> sp. nov. |
| | Labrum and clypeus almost entirely white, but basal margin of clypeus black; anterior margin subarc and incised to 1/3 length of clypeus, lateral corners slightly broad and short; a U-like white macula on posterior margin of postocellar area; anterior corners of pronotum with distinct, white maculae; all tergites with distinct, white maculae; apex of hind tibia with a small white macula on dorsal side, distinctly shorter than 1/2 length of hind tibia; middle serrulae of lancet each with 15–16 distal teeth, subbasal teeth minute. China (Hubei)..... | <i>M. shennongjiana</i> Wei & Zhao, 2011 |
| 8. | Pronotum entirely black; mesoscutellum not entirely black, center with white maculae; hind tarsus largely white; lateral corners of tergites 2–4 with distinct, white maculae, largest in lateral tergite 2 (Mesoscutellum in male entirely black). China (Shandong)..... | <i>M. maculotarsalina</i> Wei & Liu, 2005 |
| | Posterior margin of pronotum with narrow, white bands; mesoscutellum and hind tarsus entirely black; lateral corners of tergites 2–3 with distinct, white maculae, white maculae on lateral tergite 2 equal to lateral tergite 3 nearly. (Labrum and apical 2 / 3 of clypeus in male white). China (Gansu, Shaanxi)..... | <i>M. yangi</i> Wei & Zhu, 2012 |
| 9. | Serrulae of lancet clearly elevated, mastoid process like; lateral corners of tergites 2–3 with clear, white maculae, white macula on lateral tergite 2 largest. China (Gansu, Shanxi, Hebei, Henan)..... | <i>M. pentanalia</i> Wei & Chen, 2002 |
| | Serrulae of lancet not mastoid process like..... | 10 |
| 10. | Hind trochanter reddish brown. China (Hebei)..... | <i>M. canescens</i> Mallach, 1936 |
| | Hind trochanter black or white..... | 11 |
| 11. | Outer side of hind coxa entirely black..... | 12 |
| | Outer side of hind coxa with an oval, white macula basally..... | 13 |
| 12. | Without petiole of anal cell in fore wing, but with a short, across vein; labrum largely black, margins with small, triangular and pale brown maculae; clypeus entirely black; dorsal head with sparse and shallow punctures, smooth interspaces clear. China (Hebei); Caucasus; Europe..... | <i>M. erythrocnema</i> A. Costa, 1859 |
| | Petiole of anal cell in fore wing and long punctiform; labrum largely white, margins with brown and narrow maculae; clypeus not entirely black, lateral corners with obtuse and pale maculae; dorsal head with dense and coarse punctures, interspaces between punctures narrow. Europe..... | <i>M. recognata</i> Zombori, 1979 |

13. Lateral corners of tergites 3–5 with small, white maculae 14
All tergites entirely black, lateral corners without white macula 15
14. Posterior corners of pronotum with clear, white macula (Fig. 23); posterior margin of tergite 1 with broad, white bands (Fig. 23).
China (Sichuan) *M. elegansoma* sp. nov.
Pronotum entirely black; posterior margin of tegite 1 with very narrow, white band. China (Heilongjiang, Jilin, Inner Mongolia, Shanxi); North Korea; Japan; Mongolia, Europe; Turkey *M. sanguinolenta* (Gmelin, 1790)
15. Dorsal side of head with few minute, very sparse and shallow punctures, interspaces between punctures distinctly broader than diameter of punctures; postocellar area 2 times as broad as long, lateral furrow deep; hind trochanter entirely white; hind tibia and metabasitarsus largely reddish brown, narrow base and apex of hind tibia black; hind tarsus largely white; petiole of anal cell in fore wing 1.8 times as long as vein 1r-m. China (Jilin, Hebei, Henan, Hubei, Chongqing) *M. longipetiolata* Wei & Zhong, 2013
Dorsal side of head with distinct punctures, interspaces between punctures narrower than diameter of punctures; postocellar area 1.8 times as broad as long, lateral furrow very shallow and obscure; hind trochanter largely black, dorsal side with a white stripe; hind tibia reddish brown at center, base and apex black; hind tarsus entirely black; petiole of anal cell in fore wing as long as vein 1r-m. China (Gansu, Shanxi, Beijing) *M. melanosomata* Wei & Xin, 2012

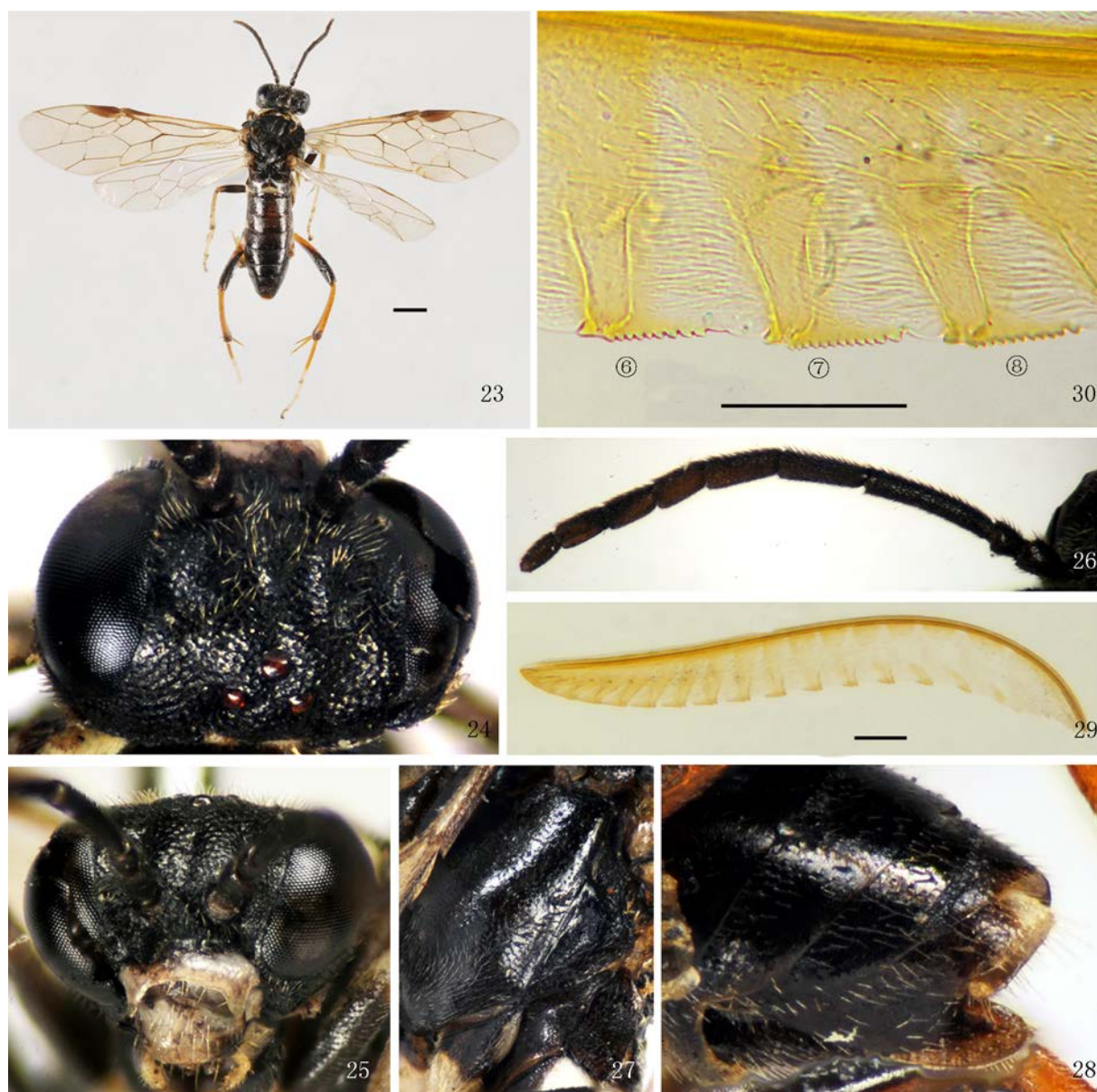
3.2.1 *Macrophya elegansoma* sp. nov. (Figs 23–30)

Diagnosis. The new species is similar to *M. rufoclypeata* Wei, 1998 from China. Compared with *M. rufoclypeata*, the new species is different by head and thorax largely black, posterior corners of pronotum white, mesoscutellum entirely black; dorsum of head less shiny, densely and minutely punctured, without smooth interspaces between punctures; antenna not entirely black, scapus and pedicel entirely reddish brown; labrum and clypeus almost entirely white, basal margin of clypeus black; anterior margin subarc and incised to 1/4 length of clypeus, lateral corners subtriangular, apical margins obtuse; posterior margin of tergite 2 with feeble white maculae, lateral corners of tergites 3–5 with distinct, white maculae. In *M. rufoclypeata*, head, thorax and pronotum largely reddish brown; mesoscutellum entirely white; dorsum of head shiny, sparsely and shallowly punctured, smooth interspaces between punctures distinct; antenna entirely black; labrum and clypeus not entirely reddish brown, base of lateral lobes of clypeus with distinct, small and white maculae; anterior margin triangular and incised to 5/8 length of clypeus, lateral corners narrow and long, apical margins acute; lateral corners of abdominal tergites 2–5 with distinct, white maculae.

Female. Body length 6.0 mm. Body mostly black. The following parts white: base of the mandibles, palp largely, labrum except for apical margin with pale brown maculae, clypeus, 2 small maculae on the posterior margin of the postocellar area, posterior corners of the pronotum, posterior margin of tergite 1, broad maculae on posterior corners of tergites 3–5, center of abdominal tergite 10, base of fore and middle coxae, all trochanters, stripes on apical 1/2 of fore femur on anterior side, anterior side largely of fore tibia, fore tarsomere almost entirely, stripes of middle coxa on outer side, apex of middle femur on anterior side, anterior side of middle tibia except for apical margins with black maculae, middle tarsomere except for apical margins with black maculae, apex and an oval macula of hind coxa on outer side, a ring on apical 1/4 of metabasitarsus, hind tarsomere 2–4 almost entirely, hind tarsomer 5 except for claws. The following parts reddish brown: apical 1/3 on outer side and except for apex largely of hind femur on inner side with black maculae, hind tibia except for apex with black maculae, a ring on basal 3/4 of metabasitarsus, a ring on apex of hind tarsomer 2. Antennomeres 5–9 black brown. Outer margin of apical sheath pale reddish brown. Body hairs yellowish brown; setae on sheath black brown. Wings hyaline, without smoky macula, stigma and veins largely black brown (Fig. 23).

Dorsal head less shiny, frons densely and shallowly punctured, without smooth interspaces between punctures, with fine microsculptures (Fig. 24); labrum and clypeus with large and shallow punctures, surface weakly coriaceous. Mesonotum less shiny, punctures on mesonotum as minute and dense as punctures on head, interspaces between punctures with fine microsculptures; dorsum of mesoscutellum less shiny, with large punctures; posttergite with some shallow and large punctures; metascutellum with indistinct punctures, microsculptures fine. Mesepisternum minutely and shallowly punctured, interspaces between punctures with fine microsculptures; anepimeron not shiny, with dense wrinkles; anterior margin of katepimeron smooth and shiny, without puncture or microsculpture; middle area with indistinct punctures, microsculptures distinct; posterior area with some large punctures, microsculptures distinct; metepisternum not shiny, minutely and densely punctured; metepimeron with shallow and large punctures, microsculptures distinct (Fig. 27). All tergites less shiny, lateral tergite 1 shallowly punctured, center with fine microsculpture; basal 1/3 of abdominal tergites 2–8 with distinct punctures, apical 2/3 with fine microsculptures. Surface of sheath coriaceous, with indistinct punctures and fine microsculptures. Hind coxa and outer side of hind femur shallowly punctured, microsculptures fine.

Labrum elevated, anterior margin of labrum truncated; clypeus weakly elevated, distinctly broader than long, slightly broader than the distance between the lower corner of the eyes; lateral sides distinctly convergent forwards, anterior margin subarc and incised to approximately 1/4 length of clypeus, lateral lobes subtriangular, apical margin obtuse (Fig. 25); malar space 0.5 times the diameter of the middle ocellus; frons elevated, ocellus slightly higher than the top of the eyes in lateral view; middle fovea shallow but distinct; lateral foveae deep, furrow like; interocellar furrow distinct, postocellar furrow indistinct; POL : OOL : OCL = 5 : 10 : 8; postocellar area weakly elevated, 1.8 times broader than long, lateral furrows slightly shallow and deep, divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete. Antenna slender, as long as head and thorax together, clearly shorter than abdomen; antennomere 2 longer than broad; antennomere 3, 0.9 times as long as antennomere 4 and 5 combined (10 : 11), antennomeres 6–9 weakly compressed (Fig. 26). Mesoscutellum roundly elevated, without carina, slightly higher than the top of the mesonotum in lateral view;



Figs 23–30. *Macrophya elegansoma* sp. nov. 23. Adult female, dorsal view. 24. Female head, dorsal view. 25. Female Head, front view. 26. Female antenna. 27. Female mesopleuron and metapleuron. 28. Ovipositor sheath, lateral view. 29. Lancet. 30. The 8th–10th serrulae of lancet. Scale bars: 23 = 1 mm, 29 = 100 μ m, 30 = 50 μ m.

posttergite with acute middle carina, metascutellum with short middle carina; dorsal-posterior platform of mesepimeron equal to the diameter of the lateral ocellus; posterior corner of metepimeron subquadrate, without appendage; mesopleuron and metapleuron as shown in Fig. 27; the distance between the cenchri 1.5 times breadth of a cenchrus. Inner tibial spur of hind leg approximately 0.75 times length of the metabasitarsus (3:4); metabasitarsus slender, approximately 1.14 times longer than following 4 tarsomeres together (8:7); claw with inner tooth as long as outer tooth. Ovipositor sheath shorter than fore femur (20:23), apical sheath as long as basal sheath, apical margin roundish in lateral view (Fig. 28). Fore wing with vein cu-a joining cell 1M at basal 1/3, vein 2r joining cell 2Rs at apical 1/3, cell 2Rs as long as cell 1Rs; petiole of anal cell in the fore wing about 3/4 times longer than vein 1r-m; petiole of anal cell in the hind wing 1/2 times length of vein cu-a. Lancet short, with 15 serrulae (Fig. 29), serrulae slightly flat and oblique, middle serrulae each with 1 proximal and 9–12 distal teeth, subbasal teeth minute, annular spine bands slightly broad, spine slightly dense; serrulae 8–10 at base as shown in Fig. 30.

Male. Unknown.

Holotype female, China, Sichuan, Mt. Emei, Xixiangchi, 19 July 2001 (elev. 2000m), Mei-Cai Wei leg.

Distribution. China (Sichuan).

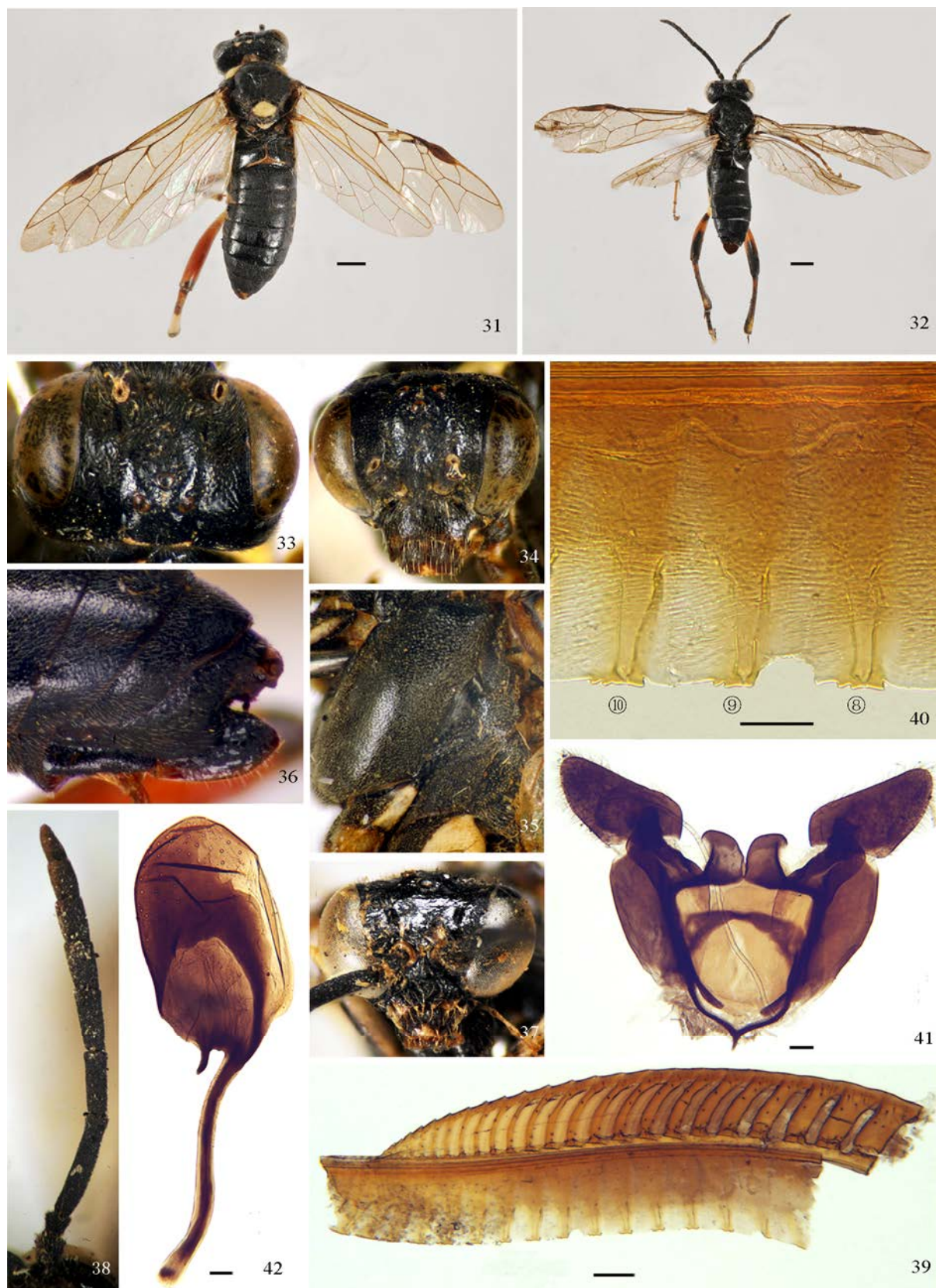
Etymology. The specific name is corresponding to the Latin “*elega*” and “*som*”, referring to its slender body.

3.2.2 *Macrophya reni* sp. nov. (Figs 31–42)

Diagnosis. The new species is similar to *M. shennongjiana* Wei & Zhao, 2011 from China. Compared with *M. shennongjiana*, the new species is characterized by labrum entirely and clypeus largely black, short parts white; clypeus half round, incised to 1/2 length of clypeus, lateral lobes narrow and long; 2 small, narrow maculae on posterior margin of postocellar area, not U-like; anterior corners of pronotum entirely black; tergites 6–9 entirely black, other tergites with distinct white maculae; subapical 1/2 of hind tibia with a long, white macula on dorsal side; middle serrulae of lancet each with 2 distal teeth, subbasal teeth large. In *M. shennongjiana*, labrum and clypeus almost entirely white, but basal margin of clypeus black; anterior margin subarc and incised to 1/3 length of clypeus, lateral corners slightly broad and short; 1 U-like white macula on posterior margin of postocellar area; anterior corners of pronotum with distinct, white maculae; all tergites with distinct, white maculae; apex of hind tibia with a small white macula on dorsal side, distinctly shorter than 1/2 length of hind tibia; middle serrulae of lancet each with 15–16 distal teeth, subbasal teeth minute.

Female. Body length 10.0mm. Body black, except some white or reddish brown parts. The following parts white: base of the mandibles, a small triangular macula on apex of the labrum, 2 small maculae on posterior margin of the postocellar area, posterior corners of the pronotum, mesoscutellum, center of posttergite, narrow band on posterior margin of tergite 1, long triangular maculae on posterior corners of tergites 2–5, center of tergite 10, base and stripes of fore coxa on outer side, anterior side largely of fore femur, anterior sides of fore tibia and tarsus, base and outer side of middle coxa, apex of middle femur on anterior side, stripes on subapex of middle tibia on outer side, middle tarsomere except for apical margins with black maculae, an oval macula of hind coxa on outer side, hind trochanter, subapical 1/2 of hind tibia on dorsal side, small maculae on apex of metabasitarsus on dorsal side and dorsal sides of hind tarsomere 2–4. The following parts reddish brown: middle femur except for base with black maculae, apex with white maculae and outer side with black maculae, hind femur except apical margin with black maculae, ventral side of hind tibia except for apical margin with black maculae and basal 1/2 on dorsal side. Body hairs silver, setae on sheath black brown. Wings hyaline, vein C brown, stigma and other veins black brown (Fig. 31).

Dorsal head less shiny, frons sparsely and shallowly punctured, interspaces between punctures with fine microsculptures; inner side of temple with small smooth area, almost without puncture (Fig. 33); labrum and clypeus with shallow punctures, surface weakly coriaceous. Mesonotum less shiny, punctures on mesonotum minuter and shallower than punctures on head, not very dense, interspaces between punctures with fine microsculptures; mesoscutellum shiny, with large and shallow punctures, microsculptures indistinct; lateral sides of posttergite with shallow punctures; metascutellum with indistinct punctures, microsculptures fine. Mesepisternum densely punctured, upper 1/2 with slightly large punctures, lower 1/2 with slightly small punctures, interspaces between punctures narrow and with fine microsculpture; anepimeron not shiny, with dense wrinkles; anterior margin of katapimeron smooth and shiny, without puncture or microsculpture; center with indistinct punctures, microsculptures distinct; posterior area with some large and coarse punctures, microsculptures distinct; metepisternum dull, minutely and densely punctured; metepimeron less shiny, large area with distinct punctures, microsculptures indistinct (Fig. 35). All abdominal tergites less shiny, lateral tergite 1



Figs 31–42. *Macrophya reni* sp. nov. 31. Adult female, dorsal view. 32. Adult male, dorsal view. 33. Female head, dorsal view. 34. Female head, front view. 35. Female mesopleuron and metapleuron. 36. Ovipositor sheath, lateral view. 37. Male head, front view. 38. Male antenna. 39. Lancet. 40. The 8th–10th serrulae of lancet. 41. Gonoforceps. 42. Penis valve. Scale bars: 31–32 = 1 mm, 39, 41 = 100 μ m, 40, 42 = 50 μ m.

shallowly punctured, center almost smooth; other tergites with minute and shallow punctures. Surface of sheath coriaceous, with indistinct punctures and fine microsculptures. Hind coxa and outer side of hind femur shallowly punctured, not dense, microsculptures fine.

Labrum elevated, anterior margin truncated; clypeus weakly elevated and subquadrate, slightly broader than the distance between the lower corner of eyes; lateral sides distinctly convergent forwards, anterior margin half round and incised to 1/2 length of clypeus, lateral lobes narrow and long, apical margin slightly acute, lateral margins slightly paralleled (Fig. 34); malar space 0.5 times the diameter of the middle ocellus; frons flat and not depressed, ocellus slightly higher than the top of the eyes in lateral view; middle fovea shallow but distinct; lateral foveae deep, furrow like; intercellular furrow distinct, postocellar furrow indistinct; POL:OOL:OCL=5:11:9; postocellar area weakly elevated, 2 times broader than long, anterior 1/2 of lateral furrows narrow and shallow, posterior 1/2 of lateral furrows deep, divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete. Antenna lost. Mesoscutellum roundly elevated, without carina, higher than the top of the mesonotum in lateral view; posttergite with short middle carina; dorsal-posterior platform of mesepimeron equal to diameter of lateral ocellus; posterior corner of metepimeron subquadrate, without appendage; mesopleuron and metapleuron as shown in Fig. 35; the distance between cenchri 2.7 times breadth of a cenchrus. Hind tibia and tarsus lost. Ovipositor sheath shorter than middle femur, apical sheath as long as basal sheath, apical margin roundish in lateral view (Fig. 36). Fore wing with vein cu-a joining cell 1M at basal 1/5, vein 2r joining cell 2Rs at apical 1/3, cell 2Rs as long as cell 1Rs; petiole of anal cell in the fore wing shorter than 1/2 times of vein 1r-m; petiole of anal cell in the hind wing 1/3 times length of vein cu-a. Lancet shortly lost (Fig. 39), middle serrulae each with 1 proximal and 2 distal teeth, subbasal teeth large, distal teeth not more than 5, distance between serrulae 11–12 as broad as serrula 11, annular spine bands slightly broad, spine slightly dense; 8th–10th serrulae at base as shown in Fig. 40.

Male. Body length 7.0 mm (Fig. 32); body color and structure similar to female, except following white parts: anterior sides of fore and middle femora, anterior side of fore tibia, fore and middle tarsomere almost entirely, apical 1/2 of middle tibia on anterior side, small maculae on posterior corners of abdominal tergite 2; head of male in anterior view as Fig. 37; male antenna as shown in Fig. 38; fore wing with vein cu-a joining cell 1M at basal 1/4, vein 2r joining cell 2Rs at apical 1/5, petiole of anal cell in fore wing about 3/4 longer than vein 1r-m; petiole of anal cell in hind wing 1/3 times longer than vein cu-a; subgenital plate longer than broad, apical margin roundish, gonoforceps as shown in Fig. 41; penis valve as shown in Fig. 42.

Holotype female, China, Ningxia, Mt. Liupan, 15 June 1996, Guo-Dong Ren leg. Paratype 1 male, the same message to holotype.

Distribution. China (Ningxia).

Etymology. The specific name is from the family name of the collector, Prof. Guo-Dong Ren.

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